The Recumbent Torso Trainer

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DEVICE AND METHOD FOR EXERCISE AND REHABILITATION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a device and method for exercise and rehabilitation and more particularly to human torso and arm isokinetic exercises and methods which utilizes elastomeric cords to provide variable resistance permitting a plurality of exercises, and which may be easily mounted upon a rigid surface such as a chairback of an exercising apparatus or wall.

2. Description of the Prior Art

In recent years, physical therapists and sports trainers alike have been emphasizing the use of natural, multi-joint, resistive exercises in the routines that they design. However, most physical therapy patients and beginning exercisers are not in condition to handle even mimimal weight loads usually due to one or more of the following factors: (1) injury, (2) lack of strength in a particular muscle group, (3) gross weakness of entire body. Therefore, there is a need for a mechanism that can create a sense of less weight.

Exercise devices which incorporate elastomeric elements or spring cables for providing resistance to movement have heretofore been known in the art. In this regard, the U.S. Patents to Wang et al No. 5,362,296; Wilkinson No. 5,234,394; Pauls et al No. 5,090,694; Sterling No. 4,921,247; Farran et al No. 4,913,423; Wilkinson No. 5,324,243; Nathaniel No.

2. Description of the Prior Art (cont)

5,013,035; and Hermanson No. 4,848,741 represent the closest prior art to the subject invention of which the applicant is aware.

However, none of these patents in any proper combination fairly suggest or teach the inventive combination of the present invention.

As such, it may be appreciated that there continues to be a need for a new and improved exercise apparatus and method as set forth by the instant invention which addresses both the problems of ease of use as well as effectiveness in construction and in this respect, the present invention substantially fulfills this need.

In none of the above is the combination of applicant's articulable resilient arm(s), quick connect and disconnect mount means, and innovative contoured bracket shown or described permitting the trainee and exercise device to perform together a commonality of tasks, whereby the articulable arm animates when stressed, flexing in an synergistic pattern mirroring the user's defined range of movement. The present combination of the articulable arm(s), quick connect and disconnect mount means, and innovative contoured bracket is unique in the field of development.

Moreover, while the above mentioned devices are directed to exercise devices, none of these devices disclose the provision (by introducing new structual and system component parts) whereby the trainee holding the handles of the extension members and performing a simple arm swing, rotatably adjusts the articulable arm(s) from an upright vertical first position to a downward vertical second position while remaining comfortably and securely positioned in the exercise station, thereby eliminating downtime of trainee or therapist for mechanical realignment or replacement of component parts allowing the trainee to continue an uninterrupted and predetermined litany of exercises.

SUMMARY OF THE INVENTION

In view of foregoing disadvantages inherent in the known types of exercise devices now present in the prior art, the present invention provides an improved exercise device. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and improved exercise device and method which has some advantages of the prior art exercise devices and none of the disadvantages.

In a preferred embodiment this is achieved by providing a contoured mounting bracket including a suitably disposed connector housing having parallel spaced-side walls containing aligned aperture cores to couple with an articulable resilient arm member having retractable pop-pins affixed on respective first end, whereby the articulable arm releasably and pivotably interconnects to the connector housing. The distal end(s) of the articulable resilient arm contain annular slots to which may be attached either metallic coil springs or elastomeric rubber cords secured by a plug or clip terminating in a hand grip. The exercise device can be disassembled for portability and allows a workout to be performed in a minimum amount of space.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood,

and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject matter of the claims appended hereto. In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting. As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

Further, the purpose of the foregoing abstract is to enable the public generally, and especially those who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and

essence of the technical disclosure of the application. The abstract is neither intended to define the invention of the application, which is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

It is a further object of the present invention to provide an exercise device and method that imparts particular forces on particular parts of the body to make it physically lighter, in essence creating a buoyancy effect, allowing resistive exercises to be performed and useful for physical therapy patients and beginning exercisers.

It is still a further object of the present invention to provide a new and improved exercise device which may be mounted to an exercising apparatus or which may be permanently or removably mounted to a wall.

Still yet another object of the present invention and method is to provide new structural and system design components which eliminate downtime of trainee or therapist for mechanical realignment or replacement of component parts to continue with a predetermined litany of exercises.

It is still another object of the present invention to provide a new and improved exercise device and method that allows the trainee and exercise device to function together developing a confluence of limbs and exercise patterns of movement whereby a seamless combination of exercises performed without relatively long delays between upper and lower torso

regions.

It is still yet another object of the present invention and method to provide a commonality of tasks between trainee and device, whereby a trainee can execute and perform independent or concurrent arm movements prearranged in a set of exercises or in creative combinations concomitantly using the legs for pedalling or pushing.

Still yet another object of the present invention and method is to provide easy operability from the exercise position, special consideration was given for the elderly, expectant, or handicapped but structurally engineered to perform reliably under constant use from a world class athlete to an orthepedic patient.

Even still another object of the present invention is to provide gentle transitions between extension and flexion which are accomplished through the self-adjusting articulable resilient arm having a cambered body design which decelerates the user through the final end range of motion. No matter how much force is exerted, limb segment velocity cannot exceed the instantaneously self adjusting resilient arm.

It is also an object of the present invention to provide a method of exercising the human torso and arms while minimizing joint shear forces.

It is yet another object of the present invention to provide a new and improved exercise device which is truly

simple to use and economical to manufacture.

Even still another object of the present invention is to provide a new and improved exercise device which is conveniently disassembled for storage and transportation and requires no power connection.

According to an important feature of the invention the articulable resilient arm member may be easily and rotatably adjusted from an upward to a downward position to provide a multitude of upper and lower torso and arm exercises in an uninterrupted progression whereby the user remains comfortably positioned in the exercise station throughout the entire workout routine. Moreover, the apparatus and method permits the same muscle groups to be exercised along different planes passing through that same muscle group, thereby achieving a more specific strengthening of that muscle group, as desired.

According to a further feature of the invention and method the handles provided at the terminal ends of the extension members in use, cause relative movement of the articulable arm. Thus when the handles are grasped by the user the user may extend his arms in a horizontal and outward position applying a slidably directed outward force on each handle which is resisted by the restorative force of the extension members whereby a small downward arm swing or upward arm swing by the user will rotate the articulable arm member from the initial position to a second position.

According to a further feature of the invention and method the articulable arm may be contoured having an obverse convex side and a reverse concave side such that when the articulable arm is arranged upright the convex dimension will be forward, that is facing the back of the user, thus creating greater concentric force during flexion and extension on the stronger muscles of the torso e.g. chest, shoulders, and abdominals. In the downward position the articulable arm is arranged such that the concave dimension is forward, that is facing the back of the user whereby mitigating the resistive force on the relative weaker muscles of the upper and lower arm e.g. biceps, triceps, and forearms.

According to still another feature of the invention and method, the articulable resilient arm may be dipped or coated in a rubber padding material to enhance asthetics and prevent abusive wear.

According to still yet another feature of the preferred invention, the pivotal mounting of the articulable arm to the connector housing is accomplished by retractable spring pop-pins affixed on respective first end of the articulable arm whereby the pop-pins are slidably received through aligned aperture cores formed in the parallel side-walls of the connector housing suitably affixed on the mounting bracket.

These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a bet-

ter understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG 1 depicts a perspective view of a prior art exercise support structure secured to the backrest of a chair utilizing a vertically adjustable knob attached to a carriage track including a transversely fixed rod having a pair of swinging arm members attached to each end in a manner set forth in U.S. Pat. 5,362,296 which clearly illustrates the necessary requirement of the user to completely stop the workout progression and leave the exercise seat for the sole purpose of having to manually adjust the position angle of the arm members.

FIG 2 depicts a rear elevation view of a prior art exercise support structure secured to the backrest of a chair utilizing a rotatable mount assembly employing a rigid extension member transversely fixed there by a bolt in a manner set forth in U.S. Pat. No. 5,234,394 which clearly illustrates the necessary requirement of the user to completely stop the workout progression and leave the exercise seat for the sole purpose of having to manually adjust the position angle of the extension member.

FIG 3 depicts a cross-sectional view of the support structure of FIG 2.

FIG. 4 depicts a frontal view of the preferred support bracket;

FIG. 5 depicts a side view thereof;

FIG. 6 depicts a top plan view thereof;

FIG. 7 depicts a perspective view of the present invention attached to a backrest;

FIG. 8 depicts an exploded view of the preferred connecting means affixed at first end to the articulable arm showing connecting pop-pins in phantom retraction being engagably received by the connector housing sidewalls affixed to the support bracket;

FIG. 9 shows a partly cut away view of a portion of the preferred connecting means illustrating the recessed coil spring in compression between two adjacent pop-pins interconnected to the connector housing;

FIG. 10 depicts an exploded top view of the preferred connecting means showing the pop-pins in phantom retraction and being positioned for engagement with the connector housing side walls affixed to the support bracket;

FIG. 11 is a perspective rear view of the preferred articulable arm in the down position;

FIG. 12 is a perspective rear view of the articulable arm in the up position;

FIG. 13 is a perspective rear view of the articulable arm showing a concave back in the up position;

FIG. 14 is a perspective side view thereof;

FIG. 15 is a perspective rear view thereof in the down position;

FIG. 16 is an in-use illustration of the present invention attached to the backrest of exercise bike showing a user performing high repetition chest presses whereby the articulable arm is in rapid fore and aft flexion;

FIG. 17 depicts an exploded top view of a magnetized alternative connecting means being slidably engaged within an alternative connector housing whereby a magnetized bolt will slidably lock the arm to the connector housing;

FIG. 18 illustrates a side view of the exercise device attached to the backrest of an exercise bike and showing an alternative arm in phantom down swing rotation, a user is performing high repetition bicep curls;

FIG. 19 depicts an exploded top view of an alternative connecting means being slidably engaged to an alternative connector housing affixed to the support bracket;

FIGS. 20-26 depict alternative embodiments of the articulable arm having one or more distal ends;

FIGS. 27 illustrates the present invention attached to an exercise bike showing the articulable arm in up and down phantom rotation being executed by the user while remaining seated;

FIG 28. illustrates an exploded view of an alternative embodiment mounted to a backrest, showing a pair of swing-arms in preliminary engagement to compatible stub shafts affixed to the support bracket.

FIG 29. illustrates a perspective view of the alternative embodiment attached to a backrest showing a pair of mounted swing-arms in an upright vertical position.

FIG 30. illustrates a perspective view thereof showing the mounted swing-arms in a vertical down position.

FIG 31. illustrates a perspective view thereof showing the mounted swing-arms in an up and down phantom rotation.

FIG 32. is an in-use illustration thereof showing a trainee rotating the swing-arms up and down.

THE RECUMBENT TORSO TRAINER

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 7, the exercise device of the present invention essentially comprises a substantially rigid support bracket 10, defined by a base plate, generally rectangular in shape having a contoured body and securable to the back-rest frame 18 of an exercise machine (not shown), including a suitably disposed connector housing longitudinally affixed having parallel spaced-apart side walls 12 each of which is provided with aligned aperture cores formed therein 15, a highly novel articulable resilient arm member 11 ergonomically designed for yieldably resisting bilateral (two arm) or uni-lateral (single arm) limb segment velocity force by a trainee permitting a litany of unlimited exercise sequence possibilities. Also comprising a part of the preferred invention is the spring-loaded connecting mechanism fixedly disposed at first end of the articulable arm member FIG. 9 releasably and pivotally interconnecting the articulable arm member 11 to the connector housing accomplished by spring biased pop-pins 17 disposed on the outer end portions of the connecting mechanism which are received through the aligned aperture cores 15 formed in the spaced-apart side walls 12 of the connector housing. The connector housing can of course be constructed in various sizes and configurations. It is also understood any manner of pivotal mount may be used such as a hinge, however it is important to mount the articulable

arm 11 so that it will not be free to rock laterally more than a very limited amount.

Referring more specifically to FIG. 7 the extendable resistance members 14 preferably comprise an elastomeric rubber cord, which will deform under tension and then contract when released, to retain it's original shape. The extendable resistance members having a first end slidably received for engagement with annular slots formed in the distal ends of the articulable arm member 11 secured by a plug or clip 13a and an oppostie end terminating in a handgrip 16 for providing a wide variety of exercises. The elastomeric cords can be of the same or different elasticity so that various incremental resistance loads can be obtained. The extendable resistance members could alternately comprise springs, cables, or other suitable materials.

FIGS. 4, 5, and 6, more clearly illustrate the support bracket comprising an obverse concave arcurate surface and a reverse convex arcurate surface structurally engineered to effectively disperse the magnitude of torsion force on the articulable resilient arm 11 and to provide balanced fulcrum stabilization for the upraised and lowered position of the resilient arm 11, thereby reducing the effects of inertia, critical in a rehabilitative setting, resulting in a more true and proper strength curve. However, it will be appreciated that varying structural designs capable of providing a fulcrum support for the articulable arm can be used. Exemplary dimensions of the support bracket are 7 to 10 inches

wide by 12 to 14 inches in length, and having a $\frac{1}{4}$" thickness, including four (4) holes 10a respectively disposed at each corner for attachment to the backrest frame 18 generally employing the domestic fasteners of the machine, which may be bolts, screws, rivets or the like, but not limited to particular hardware. A plurality of other type fasteners may also be readily used, such as a hook/loop, ridge/latch, or buckle strap fastener. All of the methods of connection to the backrest frame do not require modifying the backrest frame in anyway and allow for easy attachability. A weld could also be utilized, whereby the bracket 10 and backrest 18 are manufactured into a single unit forming an integral whole. The support bracket 10 may be constructed of any durable rigid material such as metal, fiberglass, or high impact plastic, and in the preferred embodiment is constructed of a polypropylene resin composite.

FIG. 8 illustrates an exploded perspective view of the preferred connecting mechanism in preliminary compressional engagement with the support bracket 10 showing the unique concave underside of the support bracket 10 including the longitudinally affixed spaced-side walls 12 of the connector housing, dimensioned to operably connect and pivotally secure the retracted pop-pins 17 within the aperture cores 15 of the spaced side walls 12. Also readily apparent are four geometrically aligned screws 10b at each corner of the support bracket 10 for safe and quick mounting, but as previous-

ly stated, any conventional fastener such as bolts, rivets, snaps, buckles, etc. could be utilized for attachment which allow for expedient disassembly and storage for transportation purposes.

FIG 9 illustrates a cut away view of the preferred connecting mechanism comprising a cylindrical shaft transversely oriented with respect to the support bracket 10. The shaft includes a recessed interior bore 19 containing a spiral-shaped coil spring 19a intermediately disposed between two laterally adjacent dowel pins 17 providing a tension interlink which exerts a constant outward and fixed directional force against the first ends of said pins 17 defining a spring bias pop-pin connecting mechanism which slidably retracts within the spaced-apart side walls 12 of the connector housing and extends transversely through the aligned aperture cores 15 disposed within the side walls 12 pivotally interconnecting and aligning the articulable resilient arm, dynamically supporting the 2-directional rotatable carriage motion of the articulable resilient arm 11, which functions to assist in the smooth upward and downward movement of the articulable arm 11 in an arcurate range of motion.

FIG 10 illustrates an exploded view of the preferred connecting mechanism in phantom retraction, being slidably compressed and operably connected within the parallel and spaced-side walls 12 of the connector housing affixed to the support bracket 10. Referring more specifically to FIGS 8,

9, and 10 it will be further appreciated that the most preferred connecting mechanism allows for the articulable arm 11 to be easily disengaged from the support bracket 10 for storage. It also provides for replacement of alternative arms when they are utilized.

FIGS. 11, 12, 13, 14, and 15 illustrate side and rear views respectively of the preferred articulable resilient arm. Resilient in this context, means a member such as found in a laminate or molded archery bow, a sling shot catapult, or leaf spring-type element which may be flexed while providing resistance throughout the range of the flexing motion. The preferred articulable resilient arm 11 is approximately 14 inches long, substantially curviform resistantly cambered through the body center comprising a pair of bifurcated vaulting branch members, each having two arcurate surface regions, an obverse convex surface region and a reverse concave surface region containing varying radius curvature values. The articulable arm may be constructed of any durable rigid material such as wood, metal, fiberglass, or high impact plastic, and in the preferred embodiment is constructed of a proprietary resin composite. As an optional feature, the articulable resilient arm 11 may be covered with a rubber sleeve or coating to soften torque friction. The resilient arm 11 can of course be constructed in various sizes and configurations and is not limited to any singular body construction.

FIG 16 illustrates a trainee pedalling on an exercise bicycle and concurrently performing high repetition chest presses whereby the articulable arm is in rapid synergistic fore and aft flexion, mirroring the trainee's arcs of motion. FIG 16 more specifically illustrates the concave side of the articulable resilient arm 11 positioned away from the back of the user when attached in the upright position increasing structural load tolerance of the resilient articulable arm 11 to comply and accommodate a user's greater stroke thrust and instant directional changes generated by upper torso chest and shoulder presses without sacrificing comfort or safety,subsequently when the articulalbe arm 11 is in the down position FIG. 18 and force is exerted, the concave region is positioned forward mitigating the resistance load which decelerates the user through the final range of motion allowing deconditioned club members or rehabilitation patients with limited shoulder range or joint pathology to benefit from these exercises.

FIGS. 17 and 19 each set forth an exploded view illustrating a pair of alternative embodiments in accordance with the present invention respectively showing an alternative connecting mechanism fixedly disposed on first end of the articulable arm 11 in preliminary engagement with respective alternative connector housings affixed to the support brackets 10.

More specifically FIG. 17 illustrates an alternative connecting mechanism comprising a hollow cylindrical sleeve

11a affixed at first end of articulable arm 11, containing a recessed bore wherein the bore incorporates a magnetic field when slidably engaged between the spaced side walls 12 of the alternative connecting housing wherein the magnetic field is generated by a magnetized retaining element 24 covering and abutting the outer opening of a first aperture core within the first side wall of connector housing, coaxially aligned to receive the magnetized bolt 25 which is manually threaded through the opposite and adjacent second aperture core whereby the magnetic field will cause an independent, horizontal and telescopic movement of the bolt 25 to abutt against the retaining element 24 forming an articular component and defining a magnetized rotatable mount, and whereby the bolt 25 is displaceable under manual force away from the retaining element to a retracted position.

FIG. 19 illustrates an alternative connecting mechanism comprising a cylindrical shaft affixed at first end of articulable arm including a pair of ear pins 28 each affixed on opposite end portions of the shaft, projecting laterally having diagonal cut grooves 28a on the distal end points sufficiently ramped and dimensioned to slidably adjoin with the mirror interior groove segments 27 formed within the connector housing side walls 12b forming an articular component, defining a snap-in rotatable mount.

FIG. 18 further illustrates a side view of the present invention in operative use as an integral whole mounted on an exercise bike 14a showing an alternative arm embodiment 22 being utilized by a trainee in the performance of bicep curls in combination with concurrent leg pedalling by the trainee. The alternative resilient arm 22 is seen in phantom transitional fall being pivotally moveable around the axis of the connecting mechanism 10a from an upright vertical position to a down ward vertical position.

FIGS. 20 - 26, represent alternative embodiments of the resilient arms having one or more intersecting branch members of varying sizes and shapes which may be used interchangeably on the device in order to provide varying resistance modes. Each of the alternative arms FIGS. 20 - 26, is provided with the preferred spring loaded pop-pin 17 connecting mechanism affixed on respective first end portions for interlocking the articulable arms in the desired adjustable start position.

FIG. 27 illustrates the operation of the present invention in a sequential perspective view as an integral whole attached to the backrest frame of a stationary bike 18. The preferred articulable arm 11 is detachably affixed to the connector housing 12 such that the articulable arm 11 is in a vertical position being parallel and adjacent to the support bracket 10 and being pivotally movable from a first to a second position by a trainee while remaining completely and comfortably in the exercise station. It is further observed that a trainee can pivotally rotate the articulable

arm 11 from an upward vertical first position to a downward vertical second position by extending his arms out away from his torso whole holding the extension member grips 16 and performing a small oscillating arm swing down or up to respectively lower or raise the articulable arm 11 while remaining completely in the exercise station. This single point of rotation creates ideal linear motion and correct arc of movement for torso isolation and allows for convenient simple self adjustments in two planes providing a seamless transition of exercise selections while pedalling.

Referring to FIGS 28 - 32, an alternative embodiment of the exercise device is shown. This embodiment utilizes a substantially contoured support bracket 10, two suitably disposed stub shafts 36 generally cylindrical in shape affixed to bracket 10, two resilient pivot-swing arms 30 having edge-toothed gear knobs 34 affixed at respective first ends. The support bracket 10 includes two pairs of longitudinally cut grooves 37 providing channel slots to slidably and releaseably retain the pivot swing arms 30 in an up FIG. 29 or down FIG. 30 position. The edge-toothed gear knobs 34 slidably connect to the stub shafts 36 wherein they are adjacently adjoined in a side by side interlocking relation being dependently rotatable describing a connecting assembly, pivotally locking the pair of arms 30 in a vertical collinear position FIG. 29.

The trainee positioned comfortably and completely in the exercise station will rotate the pivot-swing arms FIG. 32 by a small oscillation down or up using outstretched arms and and grasping the handles 16 of the attached extension members 14 wherein the edge-toothed knobs 34 will pivot at their centers about the circumference of the stub shaft and sequentially ratchet with higher toothed cavities of adjoining toothed knob tactily controlling the downward and upward swing of the pivot-swing arms 30 permitting axis movement of the pivot arms in a vertical hemispherical plane swinging outwardly away and down from each other in a circular track wherein the position of the pivot arms 30 are symmetrically changed. The pivot-swing arms 30 are resilient. Resilient in this context as previously stated means a member such as found in a laminate or molded archery bow, a sling shot catapult, or leaf spring-type element which may be flexed while providing resistance throughout the range of the flexing motion. The resilient pivot-swing arms 30 may be constructed of any durable rigid material such as wood, metal, fiberglass, or high impact plastic. The pivot-swing arms 30 can of course be constructed in various sizes and configurations and is not limited to any singular body construction. Extendable resistance members 14 are attached to the outer ends of the pivot-swing arms 30 wherein an annular slot is formed to slidably receive the extendable resistance members 14 being anchored by a plug or clip 29.

Though the alternative embodiment shown and described utilize two gear knob mounts 34 adjacently adjoined in the operative position, the invention also contemplates a single gear knob mount centrally disposed on the support bracket 10. The pivot-swing arms 30 are preferably welded to the gear knob mounts 34. The gear teeth have a nylon coat or manufactured with nylon or other materials with a low coefficient of friction, allowing the paired knobs 34 to ratchet smoothly in operation. A plurality of hardware fasteners can be used to attach the support bracket such as bolts, screws, rivets etc., also fasteners such as hook/loop, ridge/latch, or buckles could be utilized. A weld could also be utilized, whereby the bracket 10 and backrest are manufactured into a single unit forming an integral whole.